

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|--|---|---|
| Applicant's or agent's file reference AZ05-274WOWW | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">FOR FURTHER ACTION</div> <div style="text-align: right; font-size: small;">see Form PCT/ISA/220 as well as, where applicable, item 5 below.</div> </div> | |
| International application No. PCT/KR 2005/003764 | International filing date (<i>day/month/year</i>) 8 November 2005 (08.11.2005) | (Earliest) Priority Date (<i>day/month/year</i>) 9 November 2004 (09.11.2004) |
| Applicant <div style="text-align: center;">LG ELECTRONICS INC.</div> | | |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☒ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see continuation of this first sheet.

2. ☐ **Certain claims were found unsearchable** (see continuation of this first sheet)

3. ☐ **Unity of invention is lacking** (see continuation of this first sheet)

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in the continuation of this first sheet. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the drawings to be published with the abstract is Figure No. 3

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Continuation of first sheet

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, the international search was carried out on the basis of:

Continuation No. IV:**Text of the abstract**

(Continuation of item 5 of the first sheet)

The present invention provides a direct drive motor in a washing machine includes a stator (14) having a winding portion with coils wound thereon, a rotor (13) fixedly connected to a washing shaft (4) for direct drive of a drum, the rotor (13) having a sidewall (13b), and a rear wall (13a) with a pass through hole (131) at a center, and a connector (16) of a material having a vibration mode different from the washing shaft (4), insert molded at the center of the rear wall (13a) of the rotor (13) to form one body with the rotor (13), and fixedly connected to the washing shaft (4) to connect the rotor (13) to the washing shaft (4), and support the washing shaft (4).

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2005/003764

| A. CLASSIFICATION OF SUBJECT MATTER IPC ⁸ : H02K 1/30 (2006.01); H02K 1/28D06F37/40 (2006.01); H02K (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC | | |
|--|---|---|
| B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC ⁸ : H02K; D06F Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, espacenet, WPI, | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | WO 2002/077352 A2 (EMERSON El. Co.) 3 October 2002 (03.10.2002). <i>paragraphs 0004-0014, 0017-0020, 0037-0059; figures</i> -- | 1-20 |
| A | JP 2002/238227 A (Nidec Shibaura Corp.) 23 August 2002 (23.08.2002). <i>abstract; figures</i> -- | 1-20 |
| A | WO 1998/000902 A1 (Domel Elektromotorji in Gospod. Aparati) 8 January 1998 (08.01.1998). <i>page 4 line 14 - page 7 line 4; figures 1-4, 6</i> -- | 1-20 |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex. | | |
| * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family | | |
| Date of the actual completion of the international search 12 January 2009 (12.01.2009) | | Date of mailing of the international search report 9 March 2009 (09.03.2009) |
| Name and mailing address of the ISA/ AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24 / 535 | | Authorized officer VÁRHEGYI Celesztin Telephone No. +36 /1/ 474-5867 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2005/003764

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|---|---|-----------------------|
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| P,A | US 2005/0210604 A1 (Bertram Schmid et al) 29 September 2005 (29.09.2005) . <i>paragraphs 0007-0021, 0027-0030; figures</i> ----- | 1-20 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR 2005/003764

| Patent document cited in search report | | | Publication date | | Patent family member(s) | Publication date |
|---|---|------------|---------------------|--|----------------------------|---------------------|
| WO | A | 2002077352 | | | none | |
| JP | A | 2002238227 | | | JP A 2002238227 | 2002-08-23 |
| WO | A | 9800902 | | | TR T2 9802748T | 1999-03-22 |
| | | | | | WO A1 9800902 | 1998-01-08 |
| | | | | | EP A1 0909477 | 1999-04-21 |
| | | | | | DE T2 69709868T | 2003-02-27 |
| | | | | | AU A 3472397 | 1998-01-21 |
| | | | | | SI A 9700153 | 1999-02-28 |
| US | A | 2005210604 | | | EP A1 1580311 | 2005-09-28 |
| | | | | | US A1 2005210604 | 2005-09-29 |
| | | | | | DE A1 102004049549 | 2005-10-13 |

PATENT COOPERATION TREATY

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|---|---|---|--|-------------------------------------|-------------|----------------------|--------------------------|--------------|----------|--------------------------|---------------|--|--------------------------|--------------|----------------------------|-------------------------------------|-------------|--|--------------------------|--------------|-------------------------|--------------------------|---------------|--|--------------------------|----------------|---|
| To: BAHNG Hae Cheol KBK & ASSOCIATES 15 th Floor Yosam Building 648-23, Yeoksam-dong, Kangnam-gu, Seoul, 135-080 Republic of Korea | | <h2 style="margin: 0;">PCT</h2> <p style="margin: 5px 0;">WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY</p> <p style="margin: 10px 0;">(PCT Rule 43bis.1)</p> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Applicant's or agent's file reference AZ05-274WOWWW | | FOR FURTHER ACTION See paragraph 2 below | | | | | | | | | | | | | | | | | | | | | | | | | |
| International application No. PCT/KR 2005/003764 | International filing date (day/month/year) 8 November 2005 (08.11.2005) | Priority Date (day/month/year) 9 November 2004 (09.11.2004) | | | | | | | | | | | | | | | | | | | | | | | | | |
| International Patent Classification (IPC) or both national classification and IPC H02K 1/30 (2006.01); H02K 1/28D06F37/40 (2006.01); H02K (2006.01) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Applicant <div style="text-align: center;">LG ELECTRONICS INC.</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>1. This opinion contains indications relating to the following items:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 5%;"><input checked="" type="checkbox"/></td> <td style="width: 25%;">Cont. No. I</td> <td>Basis of the opinion</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cont. No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cont. No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cont. No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Cont. No. V</td> <td>Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cont. No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cont. No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cont. No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>2. FURTHER ACTION</p> <p>If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.</p> <p>If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.</p> <p>For further options, see Form PCT/ISA/220.</p> <p>3. For further details, see notes to Form PCT/ISA/220.</p> | | | | <input checked="" type="checkbox"/> | Cont. No. I | Basis of the opinion | <input type="checkbox"/> | Cont. No. II | Priority | <input type="checkbox"/> | Cont. No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> | Cont. No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> | Cont. No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> | Cont. No. VI | Certain documents cited | <input type="checkbox"/> | Cont. No. VII | Certain defects in the international application | <input type="checkbox"/> | Cont. No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> | Cont. No. I | Basis of the opinion | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Cont. No. II | Priority | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Cont. No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Cont. No. IV | Lack of unity of invention | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> | Cont. No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Cont. No. VI | Certain documents cited | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Cont. No. VII | Certain defects in the international application | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Cont. No. VIII | Certain observations on the international application | | | | | | | | | | | | | | | | | | | | | | | | | |
| Name and mailing address of the ISA/ AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24 / 535 | | Authorized officer VÁRHEGYI Celesztin Telephone No. +36 /1/ 474-5867 | | | | | | | | | | | | | | | | | | | | | | | | | |

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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|---|
| International application No. PCT/KR 2005/003764 |
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Continuation No. I

Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of a translation from the original language into the following language: ENGLISH, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

Continuation No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|-----|
| Novelty (N) | Claims 1-20 | YES |
| | Claims ---- | NO |
| Inventive step (IS) | Claims 1-20 | YES |
| | Claims ---- | NO |
| Industrial applicability (IA) | Claims 1-20 | YES |
| | Claims ---- | NO |

2. Citations and explanations:

Reference is made to the following documents:

D1: WO 2002/077352 A2

D2: JP 2002/238227 A

D3: WO 1998/00902 A1

D4: US 2005/0210604 A1

D1 discloses a washing machine including a tub that is rotated by a switched reluctance motor. The tub includes an outer tub and an inner tub. The drive is a direct drive or a drive assembly that includes a shaft, a belt and a spinner pulley connected to the tub. The switched reluctance motor includes a stator with a plurality of circumferentially-spaced stator segment assemblies. Winding wire is wound

around a stator segment core of the stator segment assemblies. A rotor is connected to the shaft that drives the belt and rotates the spiner pulley. A drive circuit energizes the winding wire around the stator segment assemblies based on a rotational position of the rotor. End cap assemblies are connected to opposite axial ends of the stator segment core. The end cap assemblies define an annular channel for receiving the winding wire and for preventing winding creep.

D2 teaches providing a direct drive motor for washing machine in which the degree of freedom is increased in design while decreasing the number of components. The motor comprises a rotor having a rotary magnetic body magnetized alternately with different poles along the circumferential direction and a plurality of blade members provided along the circumferential direction of the rotary magnetic body, and a stator disposed to enclose the rotor and arranged with a coil along the circumferential direction.

D3 shows an electronically commutated motor for direct drive of a washing machine drum, wherein the rotor is fixed directly to the driving shaft of the drum, with the stator being fixed to the cross-shaped support of the drum. The structure of an electronically commutated motor for direct drive of a washign machine drum makes it possible, through an optimal stator pole/intermediate space width ratio, and with an uneven air gap between the stator and the rotor, to achieve a low noise level and a relatively high moment at the motor shaft. The number of rotor poles represented by magnetic segments is greater than the number of stator poles with coils, the rotor poles/stator poles ratio factor equalling 1.3333, and the stator pole/intermediate space width ratio between the stator poles equalling 1.868.

D4 relates to a motor having a stator and a rotor providing as a direct drive for a laundry treatment appliance. The stator of the motor is preferably centered by a preferably cylindrical or conical protuberance in a bearing hole in a bearing spider or a rear wall of a tub of the laundry treatment appliance. The stator may have lugs on pole insulation which guide the rotor during installation, so that permanent-magnet poles of the rotor cannot strike soft-magnetic poles of the stator.

The subject matter of the present application is providing a direct drive motor in a washing machine, in which a structure of a driving unit in a washing machine is improved to improve processability, and current flow down to the washing shaft is cut off even if insulation between the winding portion of the stator and the rotor is broken, for preventing accidents caused by negligence of safety from taking place. To achieve the object of the present application, the present application provides a direct drive motor in a washing machine includes a stator having a winding portion with coils wound thereon, a rotor fixedly connected to a washing shaft for direct drive of a drum, the rotor having a sidewall, and a rear wall with a pass through hole at a center, and a connector of a material having a vibration mode different from the washing shaft, insert molded at the center of the rear wall of the rotor to form one body with the rotor, and fixedly connected to the washing shaft to connect the rotor to the washing shaft, and support the washing shaft.

Neither of the prior art documents cited in the international search report discloses or suggests a direct drive motor in a washing mashine which has a rotor fixedly connected to a washing shaft for direct drive of a drum and a rotor having a sidewall and rear wall with a pass through hole at the center, and has a connector of a material having a vibration mode different from the washing shaft, insert molded at the center of the rear wall of the rotor to form one body with the rotor and fixedly connected to the washing shaft to connect the rotor to the washing shaft, and support the washing shaft as independent claim 1 claims it; further the motor has a rotor having a sidewall and the rear wall formed as one body by pressing steel plate as independent claim 11 claims it; further the motor has a rotor of magnetic metal fixedly connected to a washing shaft of metal for direct drive of a drum as independent claim 18 claims it.

Consequently the subject matter of independent claims 1, 11 and 18 is new and involves an inventive step.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/KR 2005/003764

Claims 2 to 10 are dependent upon independent claim 1, claims 12 to 17 are dependent upon independent claim 11 and claims 19, 20 are dependent upon independent claim 18, thus also satisfy the requirements with respect to novelty and inventive step.

Industrial applicability is given.
